



## Some Cautionary Thoughts on Information Warfare

R. L. DiNARDO AND DANIEL J. HUGHES

ONE OF THE most curious characteristics of the United States military establishment since World War II has been its tendency to become slavishly addicted to fads. In the immediate aftermath of World War II, fascination with nuclear weapons to the exclusion of almost everything else led the Army to such unhappy experiments as the “pentomic division” and the “Davy Crockett.”<sup>1</sup> The Air Force, not to be outdone, put nuclear weapons on fighters. All of this had the result of leaving the services poorly prepared to fight a limited conventional war in Korea and a limited unconventional war in Vietnam.<sup>2</sup> Then during the late 1970s and the heyday of the military reform movement, *maneuver warfare* and *mission-oriented tactics* became the buzzwords. The new enthusiasts held up the German army of World War II as a military paradigm, its capabilities misun-

derstood by many people who had little or no knowledge of the primary German sources.<sup>3</sup>

Now, in the aftermath of the Gulf War, the United States military is once again awash in such catchphrases. Perhaps the first to weigh in was John Warden III, a USAF colonel who even before the war had posited the idea that air forces could essentially win wars alone by conducting “parallel war.” This notion, combined with the apparent success of the air campaign in the Gulf and some very dubious historical interpretation, has given lots of ammunition to those who would accuse air forces of engaging in muddled thinking.<sup>4</sup> Another even more amorphous term is *information war*. Although it has been defined in several different ways, the term has appeared increasingly in books, articles in professional military journals, and official publications.<sup>5</sup>

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This article proposes to investigate this notion and its validity, at least as manifested in the open literature. We are well aware that there is much additional material, including the very definition of information warfare, lurking beneath the shroud of official secrecy. This article, therefore, will deal with basic concepts and assumptions instead of specific capabilities and vulnerabilities that remain classified.

For many true believers, the foundations of information war can be found in a book by *Alvin and Heidi Toffler* entitled *War and Anti-War: Survival at the Dawn of the Twenty-first Century*.<sup>6</sup> The Tofflers describe human history as going through a series of waves. Each wave and its wars are based on the means by which wealth is created. Thus, the first wave, starting at the beginning of civilization and lasting to some time in the nineteenth century, was based on agriculture. The second wave, beginning as early as the Renaissance and lasting through today, was based on manufacturing. Finally, the third wave, which we are now entering, is based on information. The Tofflers' book, although not widely reviewed in the scholarly literature, has received tremendous attention and acclaim within the government, gaining the approbation of people as influential as the Speaker of the House of Representatives. The Tofflers have been most successful in getting the military, especially the Army and the Air Force, to accept the basic premises of their "wave" theory.<sup>7</sup> Alvin Toffler has been a guest lecturer at Army War College and at the Air War College for two years running. Students at both institutions, as well as the Naval War College, read *War and Anti-War* as part of the curriculum. At the Air Force Academy, an elective course is offered on information war, with a set of readings including large sections of *War and Anti-War*, as well as some other readings discussed in this article. Although the Army is somewhat more skeptical of the Tofflers' notions, the wave theory was essentially adopted officially in *Army Focus 94: Force XXI*.<sup>8</sup>

The rise of the Toffler book to prominence within the country's military hierarchies at the same time that the academic world gives it little notice is a strange phenomenon. The very simplicity of the Tofflers' theory makes the book highly attractive. However, *War and Anti-War* is a book full of mistakes. Any historian seeking to bring out these errors would find *War and Anti-War*, to use an Air Force term, a *target-rich environment*. The Tofflers' theory, a neo-Marxist concept combining economic determinism with an overarching chronological framework, is reminiscent of elements of *The Communist Manifesto*.<sup>9</sup> In order to

make history fit into their theory, the Tofflers are willing to reduce all societies (not to mention all wars between societies) to one of their simplistic broad characterizations and to rearrange certain chronologies so that events develop in the proper sequence. Unfortunately for those seeking comfort in the uncertainties of the ages, any system that seeks to grossly simplify something as complex and nuanced as the entirety of human history is bound to founder on those immovable obstacles, the facts.

This leads them into some erroneous notions. Here are a few examples. The depiction of the second-wave, industrial North overrunning the first-wave, agrarian South is an idea that serious scholars of the Civil War have long abandoned. No Confederate army was ever compelled to surrender because it lacked the means to fight. Even at Appomattox, the Army of Northern Virginia had plenty of small-arms ammunition for the infantry, plus an ample supply of artillery ammunition.<sup>10</sup> Likewise, to imply, as the book does, that Napoléon's armies were a product of second-wave mass production is simply contrary to every established fact about the period. The book's account of the origins of AirLand Battle is largely incorrect, neglecting the most important elements of the new doctrine, ignoring the purpose of change, and attributing the substance of change to the wrong people.<sup>11</sup>

Equally flawed is the notion advanced by the Tofflers that "nationalism is the ideology of the nation-state, which is a product of the industrial revolution."<sup>12</sup> Nationalism is hardly an ideology, although it can be an important component of one. Here too their facts and chronology are wrong. Nation-states became clearly recognizable entities during the seventeenth and eighteenth centuries, well before the industrial revolution took hold across Europe or the world; and to attribute something as complex as nationalism to a single factor distorts the past. The Tofflers are no more successful when they venture into the realm of intellectual history. Two of the most consequential ideologies to emerge from the nineteenth century were Marxism and Nazism. Marxism was avowedly antinationalist; and the intellectual progenitor of Nazism, German *völkisch* ideology, was based on the notion of the agriculturally based, racially pure community rather than a nation-state governed by a liberal constitution.

Two streams of thought have emerged on the nature and uses of information war. The most common, tied directly to recent technological innovations and the experiences of the Gulf War, stresses digitization

of the battlefield and incremental improvements to smart weapons, improved intelligence devices, deeper and even more precise strikes, and so forth. This view is particularly dominant in the Army's literature, though it finds its advocates in the Air Force as well.<sup>13</sup>

The more radical and speculative view is that information warfare is becoming an alternative to more traditional forms of war, a theory that would therefore discard much of the information-based weaponry of the first interpretation.<sup>14</sup> This notion, based on the Toffleresque idea of the third-wave, information-based society, holds that information can be used as a weapon. By wielding information as a weapon through the use of computers, the Internet, satellite communications, and so on, one could influence the decisions of an enemy.<sup>15</sup> Some writers have suggested using subtly altered images broadcast over television as a means of undermining a nation's will or the perceptions of its leaders, a process described rather opaquely as "neocortical warfare."<sup>16</sup>

This approach to information war has several problems. Although imaginative, most of the suggestions on potential measures, enemy reactions, and ultimate consequences are speculative beyond plausibility. The accompanying conclusions, sometimes given only by implication, are generally favorable to the author's thesis. In many cases, the author suggests that electronic measures taken against certain military or civilian targets would result in catastrophic and irreparable damage to key "information systems." These suggestions almost invariably lack any technical foundations and fail to consider countermeasures while assuming total system vulnerability. The various authors frequently advocate actions that allegedly might paralyze or confuse an adversary, but they fail to consider that the same measures might just as easily lead to entirely unanticipated results or even to consequences that would be inconsistent with or counterproductive to the original intent.

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***It's odd that the proponents of "third-wave" and "information" war should find inspiration in the writings of Sun Tzu, a "first-wave" thinker.***

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This is especially important when one considers that if these types of measures are to be undertaken to influence the thinking and behavior of foreign leaders, it would require, at the very least, a level of understanding of a country's history, culture, politics, and mind-set that seldom exists in government and even in academe. Consider, for example, if we had decided

to undertake these kinds of measures against the Soviet Union during the cold war. Whose advice should we have taken on how to implement these measures and what might have been the anticipated reaction of the Soviet leadership? Many "experts" on the Soviet Union, including Strobe Talbott, who currently is in charge of administration policy on Russia, made a great many pronouncements about the reaction of the Soviet leadership to Reagan administration policy in regards to the Soviet Union. The course of the 1980s and the collapse of the Soviet Union proved many of these prognosticators were wrong. We should also remember that the Soviet leadership was comparatively stable. How can one predict the behavior of such unstable characters as Muammar Qadhafi, Kim Jong Il, or Saddam Hussein? If academe cannot provide the kind of expertise needed to wage this kind of "information war," what can we expect from the government?

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***For all the technological wizardry and intelligence at our disposal, the coalition forces probably failed to find and kill a single mobile Scud missile launcher.***

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Accompanying this speculation is the search for supporting statements from distinguished military writers. In that group, Sun Tzu has suddenly become more quotable for those seeking ways to avoid traditional warfare rather than ways to conduct it more effectively. Sun Tzu's argument that "to subdue the enemy without fighting is the acme of skill" by attacking his strategy is perhaps the favorite aphorism.<sup>17</sup> Of course, this assumes that your enemy is willing to allow himself to be subdued without fighting. History tells us that governments are seldom so cooperative. Sun Tzu aficionados also seem unconcerned that he wrote these words in the context of ancient Chinese society, something of which we have only a limited knowledge and which may have no relation to us.<sup>18</sup>

Further difficulties appear when we take a more extended look at Sun Tzu. As a perceptive critic noted in a review of a book on Sun Tzu, Carl von Clausewitz, and Antoine Henri Jomini, all of Sun Tzu that comes down to us amounts to about 100 pages, as opposed to 600 pages of Clausewitz's writing and some 20 separate volumes published by Jomini.<sup>19</sup> In addition, if one reads Sun Tzu with care, it reads more like a series of aphorisms, some of which are relevant and many which are not, as opposed to the more systematic treatment of war in all its facets afforded by Clausewitz. One could perhaps speculate that it is the aphoristic style of Sun Tzu that makes him more attractive to readers who

lack the patience to deal with the more sophisticated Clausewitz. Someone has suggested that Sun Tzu should be studied instead of Clausewitz because, among other things, Sun Tzu is shorter.<sup>20</sup>

A more serious problem in the ideas of those who would substitute information war for traditional conflict concerns the issue of what constitutes war and what this implies for politico-military relations. In an article in a recent *Airpower Journal*, Col Richard Szafranski defines warfare as "the set of all lethal and nonlethal activities undertaken to subdue the hostile will of an adversary or enemy."<sup>21</sup> Although Szafranski is thoughtful enough to attempt to differentiate between warfare and war, his definition still causes problems. If warfare includes all nonlethal activities, does this include means such as diplomacy and policy? Perhaps policy would become the continuation of war by other means. The idea that war is the normal state of affairs and that all actions of state and society must serve that master is a discredited notion.<sup>22</sup>

Equally unsettling is the internal aspect of this redefining of the relationship between politics and war. The danger of reversing Clausewitz's ideas on civil-military relationships clearly emerges in the writing of another "information war" advocate, who argues that one of the promises of information war is that "at last, our military planners can be freed of political constraints."<sup>23</sup> This concept of information warfare is very dangerous from a civil liberties point of view. In an article in a recent issue of *Airpower Journal*, Col Owen E. Jensen wrote that in order to ensure our survivability in an information war, the military should make use of all "national assets and use all sectors of society." This would include, he said, all privately owned computers, fax machines, computer bulletin boards, and so on, including even the assets of international corporations. In fighting low-intensity conflicts against second-wave or first-wave opponents, Jensen advocates the use of bugging and various means of electronic surveillance.<sup>24</sup>

This notion is both impractical and dangerous. It is impractical because the vast differences in privately owned computer equipment and software make interoperability highly unlikely. In addition, the inclusion of so many computers would make the insertion of viruses a virtual certainty, since not all owners are as meticulous about the condition of their software as they should be. By contrast, a military system, unable to interface with any other computer system and to which only limited access is allowed, would be virtually impervious to the kinds of attacks envisioned by the proponents of information war. Even if the govern-

ment mobilized all these computers, who would operate them? To press their owners into service would be ridiculous, as they have neither the training nor experience to allow them to operate in a military environment. You cannot take the designers of the latest computer version of "Dungeons and Dragons" and set them to work on creating a new battlefield simulation.

Given the impracticality of this from a military point of view, about the only thing that would come of it would be a massive intrusion on the part of the federal government into people's privacy. Any attempt by the government to mobilize the nation's privately owned computer assets, as Jensen advocates, carries with it a whole range of civil liberties questions that must be addressed. We should think very seriously about the possibility of surrendering some of our precious freedoms for a set of theories based on a concept of history unsupported by facts.

Unfortunately, *information war* has become so expansive a term that it now threatens to become a tautology by encompassing nearly everything beyond the most primitive forms of combat. Some include traditional intelligence as information warfare, while others include the capabilities inherent in certain weapons systems. Others see the decision to interfere in Somalia as an example of successful information war, presumably by the administration's internal foes who preferred that we intervene there rather than in Sudan, the site of much worse disasters.<sup>25</sup> This logic could be extended to acts of politics, advances in weaponry, and uses of propaganda. Indeed, the use of high-tech propaganda, some quite fanciful, is a major theme of some information war advocates.

This reliance upon new and old forms of propaganda, while attractive for those who wish to substitute a new form of mind control for violence, is yet another weakness of information war. Propaganda, unfortunately, has frequently been of only limited utility. It has been used since the dawn of organized warfare in both a positive and negative sense. It has always been designed to inspire confidence in one's own people and leaders and to alternatively ridicule, frighten, or demonize one's enemy. As such, it has always occupied a supplemental place in war, but that is all. The US decision to enter World War I, for example, was not influenced by British-inspired stories about Germans bayoneting Belgian babies as much as it was by the simple fact that the United States could not tolerate German domination of Europe. For all of Stalin's hypocritical appeals to Russian patriotism, a much greater compelling factor for Russians to fight against the Germans was the brutal behavior of the German occupa-

tion authorities. The ultimate problem with even the slickest propaganda is that it does not always work, and even when it does, its effectiveness is limited.

The second approach to information warfare is often dismissed by some proponents as merely “digitizing the battlefield.”<sup>26</sup> This concept of information war concerns the importance of information in conventional war. In this regard, perhaps the most significant statement comes from Alan D. Campen, in the preface to the book he edited, *The First Information War: The Story of Communications, Computers, and Intelligence Systems*: “The outcome [of the Gulf War] turned as much on superior management of *knowledge* as it did upon performance of people or weapons.”<sup>27</sup> A number of articles have also emphasized this. The coalition forces, aided by superb communication networks, data links, satellite intelligence, and so on, were able to defeat the Iraqi forces, which had been rendered informationless by high-tech allied weaponry aimed at taking out Saddam Hussein’s communications and early warning systems. This view, too, conceals more than it reveals. The expanding and improving scholarship on the Gulf War is rapidly undercutting the simplistic, optimistic views that were prevalent immediately after the war.<sup>28</sup>

The raising of information to the place of highest performance in war has dominated military thinking in recent years. Some advocates of the new theory have sought historical examples to justify their position and have proved quite able to oversimplify or play loose with the facts. Consider, for example, the following passage from *Army Focus 94: FORCE XXI* explaining how Robert E. Lee was able to defeat Joseph Hooker’s Army of the Potomac at Chancellorsville:

Subsequently, Lee’s cavalry brought him the information that Hooker’s right flank was three miles east of Chancellorsville. Lee acted on this information and inflicted a resounding defeat. Lee won his information war, and it led to victory on the battlefield.<sup>29</sup>

It would be an understatement to say that this kind of oversimplification is intellectually dangerous. It overlooks the many factors that determined why Lee won and Hooker lost. Hooker, for example, was as well-informed of Lee’s movements as Lee was of Hooker’s. The Union commander simply misinterpreted the Confederate movements as a retreat. He did, however, alert Maj Gen Oliver O. Howard, commander of XI Corps and defender of Hooker’s right flank, and ordered Howard to be prepared for a Confederate move

against him, an order which Howard ignored.<sup>30</sup> The Confederate reconnaissance party looking for the end of Hooker’s flank included both Stonewall Jackson and J. E. B. Stuart, the two senior Confederate leaders charged with delivering the attack. While reconnoitering, the group came under artillery fire from a masked Union battery. Although the reconnaissance party took some significant casualties, both Jackson and Stuart remained unscathed.<sup>31</sup> How would the course of the battle have been different if some lucky shells had disabled both Jackson and Stuart? If any of these factors had gone in Hooker’s favor, what good would Lee’s “information advantage” have been to him? The reduction of an event as complex and uncertain as Chancellorsville to information warfare should stand as an example of one-sided thinking. The *FORCE XXI* document, in which the Army formally adopts the Toffler wave theories of history, is equally off base when it implies that the United States and its Allies won World War II because of the intelligence advantages stemming from Ultra.<sup>32</sup>

The dangers of embracing this technical version of information war are fairly obvious to anyone with an appreciation of history. One of the developments hailed by some adherents of information war concerns the improvements in communications and the advantages they confer.<sup>33</sup> Yet every improvement in communications has always carried with it the dangers of micromanagement, a peril that generally gets only lip service from information war advocates.<sup>34</sup> The recent literature on information warfare offers a particularly instructive example of distorting the historical record in the search for examples to support the new ideas. In a recent article, George Stein, using a lengthy paraphrase and quotation from a speech by Speaker of the House Newt Gingrich, cites Prussian general Helmuth von Moltke as someone who was able to harness the emerging technologies of railroads and telegraphs in the nineteenth century and create a new General Staff system accordingly.<sup>35</sup> Along the way, Moltke conveniently uses words that any information warrior would be proud to utter. It is highly doubtful that Moltke ever actually spoke the words attributed to him in this case. This question aside, these “statements” represent a very one-sided view of Moltke’s opinions.<sup>36</sup> Moltke designed his system of giving orders not because information was readily dispatched over the new telegraph lines, but because it was not. Thus, he stressed subordinate initiative rather than the transfer of information. Moltke was in fact very suspicious of excessive reliance upon communications and fully under-

stood the dangers posed by a capable telegraph system. He warned that the "most unfortunate commander of all" was the one with "a telegraph wire attached to his back."<sup>37</sup> Stein has misquoted Gingrich, who paraphrased Moltke's talks with himself. Evidently, neither Gingrich nor Stein checked the possible sources or placed Moltke's alleged statements in their historical context. Meanwhile, the readers of the professional literature have two new sets of erroneous "facts" ready to be mobilized in the war for information warfare.

The improvement of communications at the disposal of political leaders and military commanders has always carried the danger of disrupting the chain of command. Adolf Hitler, Joseph Stalin, and most recently Saddam Hussein have been held up as models of this. Lest one think that this applies only to dictators, the facts show that it goes for democracies as well. In the Civil War, both Jefferson Davis and Abraham Lincoln interfered with the conduct of military operations. So did Secretary of War Edwin Stanton and Ulysses S. Grant as commander in chief of the army, often driving commanders in the field such as William S. Rosecrans and George Thomas almost to distraction.<sup>38</sup> During World War II, the combination of wireless radio, a fertile imagination, and a stubborn personality made Winston Churchill almost as dangerous at times to the Allies as he was to the Axis powers.<sup>39</sup> Who can forget the image of Lyndon Johnson essentially conducting the defense of Khe Sanh from a sand table in the White House basement? Thus, every improvement in communications always carries this danger, which can be averted only if the higher commanders show the discipline required to avoid micromanagement.

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Another danger posed by this emerging version of information war is data overload, again something that has only been given lip service. The danger now is that commanders will be so bombarded by a blizzard of largely extraneous or even unessential data that it will obscure the real issues that have to be dealt with. One of the important distinctions that some information war advocates fail to make here is that between data and information. In order to be information, to have content, data must be interpreted and thus is subject to the imperfections of human beings. For example, the mat-

ter of the accuracy of bomb damage assessment is one of the hottest arguments still raging concerning the Gulf War. In addition, all the intelligence data collection in the world could not solve some problems. For all the technological wizardry and intelligence at our disposal, the coalition forces probably failed to find and kill a single mobile Scud missile launcher.<sup>40</sup> For all of the data collection undertaken by the Stasi, the East German intelligence service, the East German authorities never had the slightest clue that their whole system would come crashing down so quickly.

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***One does not base grand theories on false facts; nor does one prepare for the future by distorting the past.***

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The reverse of data overload is also a problem. What should commanders do if they do not have all the data or information they want or think they need or have learned to depend on in peacetime training? If information is the most important thing in modern warfare, does its absence give an irresolute commander the excuse to do nothing? History tells us that the great captains have always sought information concerning their opponents. Ultimately, however, they had to make decisions in the "fog of uncertainty," to use Clausewitz's phrase.<sup>41</sup> The real factor of importance here is that all commanders must share a characteristic, moral courage, something that all the information in the world cannot replace. What would all our technology have meant to us in the Gulf if George Bush had taken counsel of his fears even before humanitarian concerns halted the allied offensive?

There are several other things that information cannot replace. In this regard, Campen's claim that the Gulf War victory was as much the result of the management of information as the performance of people and weapons grossly overstates the importance of information. The allied victory was due to the superior training, planning, and execution of all the components involved in Operation Desert Storm. All the information in the world will not help poorly motivated, badly trained, and undisciplined soldiers led by indecisive leaders fighting without a sound doctrine, particularly under the unique circumstances of the Gulf War. The Tofflers, for example, extol the Russian Nomad satellite surveillance system's capability of imagery resolution down to about five meters.<sup>42</sup> How much good did it do the poorly motivated conscripts fighting in Chechnya?

When asked why the Confederates lost the battle of Gettysburg, George Pickett is said to have answered,

"I think the Union Army had something to do with it."<sup>43</sup> In looking at the Gulf War, Pickett's alleged comment is worth remembering. It should be borne in mind that for the coalition forces, largely based on those of the North Atlantic Treaty Organization (NATO), Iraq was the perfect enemy in the perfect environment. What essentially happened was the military equivalent of "wish chess" against an opponent accurately described by a perceptive critic as a "third-class Soviet clone."<sup>44</sup> More formidable, better-trained armies have often been able to fight on when their communications were inoperative. During the Normandy campaign in 1944, for example, the Germans often had to fight under conditions of radio silence.<sup>45</sup> Yet sound tactical doctrine, good leadership at the lower levels, and sheer rock-ribbed toughness allowed them to fight the numerically vastly superior Allies to a stalemate for almost two months before attrition finally ground the German forces down. In the Pacific, the Japanese were able to refine their tactics late in the war to a point where they were able to inflict serious losses on American forces at Peleliu, Iwo Jima, and Okinawa.<sup>46</sup>

Information war has been subsumed into a somewhat broader notion, the revolution in military affairs (RMA). Briefly put, this concept holds that advances in technology, especially information technology, have rendered existing methods of warfare as obsolete.<sup>47</sup> Although the term was introduced before the publication of *War and Anti-War*, some believers in the RMA have completely adopted the Tofflers' framework. Now many articles on this subject are loaded with references to "second-wave" and "third-wave" warfare.<sup>48</sup> Proponents of the RMA such as Andy Marshall, head of the Office of Net Assessment, argue that the period we are now in is similar to that between the world wars, when developments in aviation, internal combustion engines, radar, and radio led to the creation of strategic bombing in the United States and blitzkrieg in Germany.<sup>49</sup> Some authors, reading the current theory backward into history, now see military revolutions everywhere. This has led to some rather odd linguistic formulations such as "Napoléon took full advantage of the evolving revolution in military affairs."<sup>50</sup>

History, however, again exposes the weaknesses in this kind of simplistic thinking. Before strategic bombing could be executed in World War II, its theoretical foundation had been laid prior to the advent of the required technology. Likewise, the tactical concepts the German army used in World War II had really been developed in the later stages of World War I. These concepts were then wedded to the strategic theo-

ries and related ideas of Clausewitz, Helmuth von Moltke, Alfred von Schlieffen, and Sigismund Schlichting. In no way did Hitler impose any ideas on the German army in the interwar period, as some have alleged.<sup>51</sup> In fact, taking the long view that history provides, we can see that the nature of war is far more evolutionary than revolutionary.

All of this is not to say that we are mindlessly against technology.<sup>52</sup> If emerging technology can be harnessed to enhance our ability to defend the nation, it should be. History has shown repeatedly, however, that technology is best incorporated in the context of enhancing such methods that have already proven successful. This can only be accomplished through a rigorous and integrated study of military affairs. In their excellent book on military disaster, Eliot Cohen and John Gooch write that

military organizations should inculcate in their members a relentless empiricism, a disdain for a priori theorizing if they are to succeed. The "learners" in military organizations must cultivate the temperament of the historian, the detective, or the journalist, rather than the theoretical bent of the social scientist or philosopher.<sup>53</sup>

What is so disturbing about information warfare and the RMA is that some of its adherents have done precisely what Cohen and Gooch properly warn against. If the facts get in the way of a theory, then the theory should be discarded, not the facts of history. Some have privately expressed to the authors their defense of the inaccuracies of the works cited here with the argument that the facts are unimportant. This is, of course, nonsense. One does not base grand theories on false facts; nor does one prepare for the future by distorting the past.

## Notes

1. See Gen Maxwell Taylor, *The Uncertain Trumpet* (New York: Harper and Brothers, 1960); and Andrew F. Krepinevich, *The Army and Vietnam* (Baltimore: Johns Hopkins University Press, 1986). The Davy Crockett was a hand-fired tactical nuclear weapon with a range of 1,500 meters and a blast radius of 3,000.

2. Earl H. Tilford, Jr., *Setup: What the Air Force Did in Vietnam and Why* (Maxwell AFB, Ala.: Air University Press, 1991), 1–44.

3. See, for example, Lt Col Paul Tiberi, "German versus Soviet Blitzkrieg," *Military Review* 65, no. 9 (September 1985): 63–71; and Maj George A. Higgins, "German and US Operational Art: A Contrast in Maneuver," *Military Review* 65, no. 10 (October 1985): 22–29. William S. Lind and Richard S. Moore, *Maneuver Warfare Handbook* (Boul-



der, Colo.: Westview Press, 1985) was of the same genre. A cautionary voice in this matter is to be found in Daniel J. Hughes, "Abuses of German Military History," *Military Review* 66, no. 12 (December 1986): 66–76.

4. For his pre-Gulf War thinking, see John A. Warden III, *The Air Campaign: Planning for Combat* (Washington, D.C.: National Defense University, 1988). A sample of his postwar writing is in his "The Enemy as a System," *Airpower Journal* 9, no. 1 (Spring 1995): 40–55.

5. See, for example, Alan D. Campen, ed., *The First Information War: The Story of Communications, Computers, and Intelligence Systems* (Fairfax, Va.: AFCEA International Press, 1992); George J. Stein, "Information Warfare," *Airpower Journal* 9, no. 1 (Spring 1995): 31–39; Col Owen E. Jensen, "Information Warfare: Principles of Third-Wave War," *Airpower Journal* 8, no. 4 (Winter 1994): 35–43; and Department of the Army, *Army Focus* 94: *FORCE XXI* (Washington, D.C.: Department of the Army, 1994), 17–22.

6. Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the Twenty-first Century* (New York: Warner Books, 1993).

7. Ibid., 27–87. Such reviews of the book that have appeared are not impressive. See, for example, the reviews by Eliot A. Cohen in *Foreign Affairs* 73, no. 3 (May/June 1994): 156; and by Frank C. Mahncke in *Naval War College Review* 47, no. 3 (Summer 1994): 132–33. See David Jablonsky, *The Owl of Minerva Flies at Twilight: Doctrinal Change and Continuity and the Revolution in Military Affairs* (Carlisle, Pa.: Army War College, 1994), 7–10; and *Army Focus* 94, 9–15. Although the Tofflers claim that American generals were influenced by Alvin Toffler's earlier book, *The Third Wave* (New York: Bantam Books, 1984), a check of military periodical literature reveals a distinct dearth of citations. Alvin and Heidi Toffler, 10–11.

8. This is based on personal knowledge and observations and on information obtained by telephone calls to other institutions. *Army Focus* 94, 9–15.

9. On this point, note Hendrik Hertzberg's commentary "Marxism: The Sequel," *The New Yorker*, 13 February 1995, 6–7.

10. Alvin and Heidi Toffler, 20, 39. Instead of running into a supply train with food, they met an ammunition train by mistake. The Army of Northern Virginia had more ammunition than their underfed horses could haul. See James M. McPherson, *Battle Cry of Freedom: The Era of the Civil War* (New York: Oxford University Press, 1988), 847.

11. For a more realistic overview of the origins of AirLand Battle doctrine, see John Romjue, *From Active Defense to AirLand Battle: The Development of Army Doctrine, 1973–1982* (Fort Monroe, Va.: Historical Office, US Army Training and Doctrine Command, 1984). For an account of the previous doctrine, which introduced the term *AirLand Battle* in 1976, see Paul Herbert, *Deciding What Has to be Done: General William E. DePuy and the 1976*

*Edition of FM 100-5* (Fort Leavenworth, Kans.: Combat Studies Institute, Command and General Staff College, 1988), especially page 9.

12. Alvin and Heidi Toffler, 23.

13. See, for example, Gen Gordon R. Sullivan and Col James M. Dubik, "Land Warfare in the 21st Century," *Military Review* 73, no. 9 (September 1993): 13–32; idem, "War in the Information Age," *Military Review* 74, no. 4 (April 1994): 46–62; and Col Gary B. Griffin, "Future Foes, Future Fights," *Military Review* 74, no. 11 (November 1994): 56–60. Note also Col Edward Mann, "Desert Storm: The First Information War?" *Airpower Journal* 8, no. 4 (Winter 1994): 4–14.

14. Col Richard Szafranski, "Neocortical Warfare? The Acme of Skill," *Military Review* 74, no. 11 (November 1994): 41–55; idem, "A Theory of Information Warfare: Preparing for 2020," *Airpower Journal* 9, no. 1 (Spring 1995): 56–65; and Stein, 31–39.

15. See, for example, Alvin and Heidi Toffler, 237–38; and Stein, 32.

16. Szafranski, "Neocortical Warfare?" *passim*.

17. Sun Tzu, *The Art of War*, ed. Samuel B. Griffith (London: Oxford University Press, 1963), 77. It's odd that the proponents of "third-wave" and "information" war should find inspiration in the writings of Sun Tzu, a "first-wave" thinker.

18. In a speech to National Defense University on 3 May 1994, Speaker Gingrich argued that Clausewitz is outdated because he is tied to the concepts of Napoleonic warfare, while omitting the fact that Sun Tzu came from a society that has no relation to us in any way, shape, or form. Rep Newt Gingrich, "Information Warfare: Definition, Doctrine and Direction," speech National Defense University, Washington, D.C., 3 May 1994, 5.

19. See the review by Arden Bucholz of Michael Handel's *Masters of War: Sun Tzu, Clausewitz and Jomini in War in History* 1, no. 3 (November 1994): 355–56.

20. Gingrich speech, 3 May 1994, 5.

21. Szafranski, "A Theory of Information Warfare: Preparing for 2020," 57.

22. Briefly stated, Leon Trotsky held that in order for Russia to go forward, it had to be part of world revolution. In addition, if a country were to avoid the dangers of "bureaucratization," it had to remain in a permanent state of revolution. Leon Trotsky, *Permanent Revolution* (Calcutta, India: Gupta, Rahman, and Gupta, 1947). General Ludendorff's ideas of "total war" fall into the same category. Erich Ludendorff, *Der totale Krieg* (Munich: Ludendorffs verlag, 1935). The English version, *The Nation at War*, translated by A. S. Rappoport (London: Hutchinson, n.d.) clearly presents Ludendorff's views that everything must be subservient to war. Hitler's thinking on this subject can be found in his sequel to *Mein Kampf*, published in the United States as *Hitler's Secret Book*, translated by S. Attanasio (1961; reprint, Avenal, N.J.: Outlet Book Co., 1966), 5–7.

23. Jensen, 42. Jensen's article, packed with historical inaccuracies, is a classic case of the dangers of applying the Tofflers' neo-Marxist framework to real problems. The phrase "industrial-age Napoleonic France" should suffice as an example.

24. Ibid., 39. See also Alvin and Heidi Toffler, 239.

25. Stein, 34.

26. Ibid., 39.

27. Campen, vii.

28. Some examples of the more optimistic view are Campen, *The First Information War*; and Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington, D.C.: Smithsonian Institution Press, 1992), 240–68; and most recently Brig Gen Robert H. Scales, *Certain Victory: The U.S. Army in the Gulf War* (Washington, D.C.: Office of the Chief of Staff, US Army, 1993). More skeptical views are Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, D.C.: Department of the Air Force, 1993); Michael R. Gordon and Gen Bernard E. Trainor, *The Generals' War: The Inside Story of the War in the Gulf* (Boston: Little, Brown and Co., 1995); and H. R. H. Gen Khaled Bin Sultan and Patrick Seale, *Desert Warrior: A Personal View of the Gulf War by the Joint Forces Commander* (New York: HarperCollins, 1995).

29. *Army Focus* 94, 17.

30. United States War Department, *Official Records of the War of the Rebellion* (Washington, D.C.: Government Printing Office, 1888–1902), series 1, vol. 25, pt. 2, 360–61.

31. G. F. R. Henderson, *Stonewall Jackson and the American Civil War* (1919; reprint, New York: DaCapo Printers, Inc., 1988), 658.

32. A good study on the use and limitations of Ultra in World War II is Ralph Bennett, *ULTRA in the West: The Normandy Campaign, 1944–45* (New York: Scribner, 1979). The ghastly losses suffered by the German army and air force on the Russian Front may also have had something to do with Germany's defeat in World War II.

33. Most of the articles in the Campen book deal with this issue. In fact, an uncharitable reader might be inclined to dismiss *The First Information War* as nothing more than an encomium designed to serve the agenda of the Army Signal Corps.

34. David Jablonsky, "US Military Doctrine and the Revolution in Military Affairs," *Parameters* 24, no. 3 (Autumn 1994): 28.

35. Stein, 36.

36. Stein's quotation relies on the speech by Gingrich given at National Defense University on 3 May 1994, for which no transcript was available at the time. Through the assistance of Professor Daniel T. Kuehl at National Defense University, we were able to obtain a transcript. A study of the transcript leads these authors to two conclusions. First, it is quite clear that Stein, in attempting to quote from memory, accidentally misquoted Gingrich. Compare Stein, 36, with

Gingrich speech, 3. The second conclusion is that Gingrich distorted the historical record on Moltke. Although Moltke was a prescient individual, he did not possess the Nostradamus-like vision Gingrich attributes to him. Also, although Moltke did make some money by investing in railroads, he certainly did not become wealthy by doing so. He gained much more wealth through the donatives he received from the government after the Franco-Prussian War.

37. Daniel J. Hughes, ed., *Moltke on the Art of War: Selected Writings* (Novato, Calif.: Presidio Press, 1993), 77.

38. Wiley Sword, *Embrace an Angry Wind: The Confederacy's Last Hurrah* (New York: HarperCollins, 1992), 311.

39. See Correlli Barnett, *The Desert Generals*, 2d ed. (Bloomington, Ind.: Indiana University Press, 1981), 138; and David Fraser, "Alanbrooke," in John Keegan, ed., *Churchill's Generals* (New York: G. Weidenfeld, 1991), 91–92.

40. Hallion, 245.

41. Carl von Clausewitz, *On War*, trans. and ed. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976), 101.

42. Alvin and Heidi Toffler, 185.

43. The most commonly cited source for this quote by Pickett is his widow, LaSalle Corbell Pickett. Carol Reardon, "Pickett's Charge," in Gary W. Gallagher, ed., *The Third Day at Gettysburg and Beyond* (Chapel Hill, N.C.: University of North Carolina Press, 1994), 84.

44. "Wish chess" occurs when one's opponent makes exactly the move that one wishes he would make. Col Richard M. Swain, USA, Retired, "Adapting to Change in Times of Peace," *Military Review* 74, no. 7 (July 1994): 58.

45. A combination of Ultra intercepts and direction finding allowed the Allies to pinpoint the location of the headquarters of Panzer Group West, which was knocked out in an air raid. Bennett, 68. A good account of the Germans fighting under tactical radio silence is in John Keegan, *Six Armies in Normandy: From D-Day to the Liberation of Paris, June 6th–August 25th, 1944* (New York: Viking Press, 1982), 154.

46. Larry Addington, *The Patterns of War Since the Eighteenth Century* (Bloomington, Ind.: Indiana University Press, 1984), 244.

47. Campen, vii, for example, considers the Gulf War to have been fundamentally different from any previous war. See also Michael J. Mazarr, *The Revolution in Military Affairs: A Framework for Defense Planning* (Carlisle, Pa.: Strategic Studies Institute, Army War College, 1994).

48. See Mazarr, 23; and Jablonsky, 10. For an examination of the RMA without the Toffler style "wave" framework, see Eliot A. Cohen, "Come the Revolution," *National Review* 47, no. 14 (31 July 1995): 26–30.

49. Bradley Graham, "Revolutionary Warfare," *Washington Post National Weekly Edition* 12, no. 18 (6–12 March 1995): 6. Some cautionary thoughts can be found in Antulio

J. Echevarria and John M. Shaw, "The New Military Revolution: Post-Industrial Change," *Parameters* 22, no. 4 (Winter 1992–1993): 78.

50. Mazarr, 1.

51. Jablonsky, 34.

52. In the interests of being absolutely honest, however, we do admit that one of the authors wrote his portion of this article with a fountain pen.

53. Eliot A. Cohen and John Gooch, *Military Misfortunes: The Anatomy of Failure in War* (New York: Vintage Books, 1991), 236–37.

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